

**UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF OHIO
WESTERN DIVISION**

VIVIAN BERT, et al.,)	CASE NO. C-1-02-467
)	
Plaintiffs,)	Judge Sandra S. Beckwith
)	Magistrate Judge Timothy S. Hogan
)	
v.)	
)	
AK STEEL,)	
)	
Defendant.)	

SUPPLEMENTAL EXPERT REPORT
REGARDING HIRING INTO LABORER POSITIONS
AT THE MIDDLETOWN WORKS AND ASHLAND WORKS OF AK STEEL
EDWIN L. BRADLEY, Ph.D.

I am the CEO and founder of Quantitative Research Associates (“QRA”). QRA provides statistical and computing consulting services. I have applied statistical methodology in the fields of litigation, medical research and business applications for over 38 years. I have been accepted as an expert witness in both State and Federal Courts on a variety of issues, including employment discrimination. I am an author of over 215 publications and research papers. My work has appeared in scientific journals such as *American Statistician*, *Journal of the American Statistical Association*, *IMA Journal of Mathematics Applied in Business and Industry*, and *Technometrics*. I received my Ph.D. in statistics from The University of Florida in 1969. I was a tenured Professor in the Department of Biostatistics at The University of Alabama at Birmingham (“UAB”), where I taught and conducted research for 28 years. I am currently Professor Emeritus of Biostatistics at UAB. A copy of my curriculum vitae, attached hereto in Appendix A, lists my qualifications and publications

in the field of statistics, and sets forth cases in which I have provided expert testimony in the last four years.¹

Introduction

I previously filed an Expert Report on March 1, 2005 that examined the racial composition of the hiring selections for the Laborer positions at AK Steel's Middletown, Ohio Works and Ashland, Kentucky Works² (collectively "AK Steel") for the period from January 1, 2000 through December 31, 2002. Counsel for the plaintiffs has asked me to update my analyses using additional data which has now been provided by AK Steel, and to determine whether its selection process for this job has had an adverse impact against African-American applicants for the period from January 1, 2000 through October 29, 2003. Additionally, I have been asked to determine the number of African-Americans potentially affected by the hiring process for the period June 30, 1999 through the present.³

Summary of Conclusions

Based on my analyses, conducted for the period from January 1, 2000 through October 29, 2003, I have reached the following conclusions:

- There have been over 600 African-Americans potentially affected by the hiring decisions regarding the Laborer position at AK Steel during the period from January 1, 2000 to October 29, 2003;
- The selection process used by AK Steel for filling Laborer positions from January 1, 2000 through October 29, 2003 has had an adverse impact against African-Americans applying for these positions.

¹ My time for consultation, preparation and analysis is billed at the rate of \$400 per hour, and for testifying at the rate of \$600 per hour.

² The Ashland Works consist of two facilities – the Coke Works and the West Works.

³ It is my understanding that the class in this case consists of all African-Americans potentially affected by the Laborer hiring process from June 30, 1999 (300 days prior to the filing of the earliest EEOC charge on April 25, 2000) to the present. I have only received applicant data and/or hardcopy documentation from January 1, 2000 through October 29, 2003. Thus, the number of African-Americans potentially affected by this hiring process could actually be greater than the number reflected in this Report.

Information Relied Upon

I have been provided two electronic files produced by AK Steel containing hiring information, as well as other hardcopy and imaged documentation relating to this matter. For my analyses, I relied primarily on the following:

- Hardcopy applications and application flow information for the Middletown, Ohio Works produced in 33 banker boxes containing Bates numbered documents AKM-000001 through AKM-118119 (“Middletown Hardcopy”);
- Electronic file “Bert Data File 1 (W0330570).xls” containing application and hiring information for the Middletown, Ohio Works for the period September 1, 2000 through August 31, 2002;
- CD labeled “AK Steel 2” containing nearly 23,000 images and index files of additional application flow information for the Middletown, Ohio Works (“Middletown Images”);
- Electronic file “Ashland App Flow (no ssn) (W0377464).xls” containing application and hiring information for the Ashland, Kentucky Works for the period October 24, 2000 through November 18, 2002;
- Hardcopy applications and application flow information for the Ashland, Kentucky Works produced in 13 banker boxes containing Bates numbered documents AKA-000001 through AKA-044455 (“Ashland Hardcopy”);
- CD labeled “AKA03” containing over 7,500 images and index files of additional application flow information for the Ashland, Kentucky Works (“Ashland Images”);
- February 16, 2005 deposition of Susan Lester, Manager of Human Resources for the Ashland, Kentucky Works (“Lester Deposition”); and
- February 16, 2005 deposition of Phyllis Short, General Manager of Human Resources for AK Steel and previously Manager of Human Resources for the Middletown Works (“Short Deposition”);

Adverse Impact

Adverse impact can be determined by either calculating the number of "standard deviations", using sound and commonly accepted principles of statistics, or through the use of the "80%" or "four-fifths" rule contained in §1607.4 of the *Uniform Guidelines on Employee Selection Procedures* (“*Uniform Guidelines*”). Statistical significance, in the field of employment discrimination and in other areas of science, is generally accepted as occurring at the .05 level of significance (sometimes stated inversely as a 95% confidence level). This means that the probability that a given disparity

between the African-American and white rates of selection being related to chance (randomness), rather than race, is 1 chance in 20. When testing to determine whether a procedure has adverse impact against a protected group, such as African-Americans, a one-tailed assumption is appropriate. For statistical tests using a one-tailed assumption, a statistically significant result at the .05 level of significance occurs when the test yields 1.65 or more standard deviations.⁴ In conducting my analyses, I have used a .05 level of significance as the appropriate level in deciding when observed disparities are related to race rather than chance.⁵ Therefore, when a given disparity is described as statistically significant in this Report, it means that it is significant because the risk of race not being related to the disparity is only 1 in 20, or less.

The relevant portion of Section 1607.4 of the *Uniform Guidelines*, which I have applied in determining adverse impact by the "four-fifths" (80%) rule for this Report, states the following:

- D. Adverse impact and the "four-fifths rule". A selection rate for any race, sex, or ethnic group which is less than four-fifths (4/5) (or eighty percent) of the rate for the group with the highest rate will generally be regarded by the Federal enforcement agencies as evidence of adverse impact, while a greater than four-fifths rate will generally not be regarded by Federal enforcement agencies as evidence of adverse impact. Smaller differences in selection rate may nevertheless constitute adverse impact, where they are significant in both statistical and practical terms

⁴ The threshold value for statistical significance at the .05 level of significance using a two-tailed assumption is 1.96 standard deviations. Both the one-tailed and two-tailed assumptions declare a result not statistically significant at the .05 level of significance if it is less than 1.65 standard deviations, and both assumptions declare a result statistically significant at the .05 level of significance if it is 1.96 or more standard deviations. These two assumptions only differ in declaring statistical significance at the .05 level of significance if the resulting number of standard deviations lies between 1.65 and 1.96. The computation of the number of standard deviations is the same whether a one-tailed or two-tailed assumption is used. In this Report, I indicate the number of standard deviations statistic so that the Court can make the decision regarding the statistical significance of a result.

⁵ The larger the number of standard deviations, the smaller the probability, i.e., the less likely the result occurs solely due to chance. Statistical significance means that results are not likely due to chance, and are thereby related to race, at a certain confidence level. When testing to determine whether a procedure has adverse impact against a protected group, statistical significance occurs at the 95% confidence level (5% probability of being due to chance) for 1.65 or more standard deviations, at the 99% confidence level (1% probability of being due to chance) for 2.33 or more standard deviations, and at the 99.9% confidence level (0.1% probability of being due to chance) for 3.09 or more standard deviations.

or where a user's actions have discouraged applicants disproportionately on grounds of race, sex, or ethnic group. ***

Throughout this Report, results with standard deviations that are negative (i.e., preceded by a minus sign) and adverse impact ratios of less than 100% indicate that the African-American representation is less than expected.

Analysis of Hiring Selections For Laborer Positions

The procedure for hiring into the Laborer positions at AK Steel was described in the Lester and Short Depositions and can be summarized as follows:

- Submission of an application for employment with AK Steel through the Ohio Bureau of Employment for the Middletown Works or the Kentucky Bureau of Employment for the Ashland Works.⁶ Applications from individuals are not accepted at the AK Steel facilities.⁷
- An initial screen by the Ohio and Kentucky Bureaus of Employment personnel for minimum qualifications ("MQ") that consist of an age restriction (must be 18 or older), high school graduate (or GED),⁸ and, in the case of the Middletown Works, some prior manufacturing experience.⁹
- Those applicants passing the MQ at the Ohio and Kentucky Bureaus of Employment are forwarded to the Human Resources Department at each respective Works.¹⁰
- AK Steel's Human Resources Department at each respective Works again reviews for MQ and checks if an applicant has been convicted of a crime¹¹ or if the applicant has previous work history problems, such as absenteeism or prior termination by AK Steel.¹²
- Those applicants passing the initial screenings are then scheduled, by phone, for testing.¹³

⁶ Applications from African-Americans are accepted for the Ashland Works when completed and returned at job fairs (Lester Deposition pp. 36-37).

⁷ Lester Deposition, pp. 29-30, 34-35 and Short Deposition, pp. 56-57, 60.

⁸ Lester Deposition, pp. 26-27 and Short Deposition, pp. 7-8.

⁹ At one time a minimum of two years manufacturing experience was required at the Middletown Works (Short Deposition pp. 9-10). However, more recently that restriction has been eased. It is unclear whether the Ohio Bureau of Employment is aware of this modification in MQ (Short Deposition pp. 140-141). Previous manufacturing experience is not a requirement at the Ashland Works. (Lester Deposition, p. 27.)

¹⁰ Lester Deposition, p. 42 and Short Deposition, pp. 10, 82-84.

¹¹ At the Middletown Works, only felony convictions are considered and result in disqualification, regardless of when they occurred (Short Deposition pp. 120, 124-125). At the Ashland Works, conviction of either a misdemeanor or felony within the last 5 to 7 years results in disqualification (Lester Deposition pp. 64, 98-99).

¹² Lester Deposition, p. 63 and Short Deposition, p. 83.

¹³ No set procedures are in place regarding the number of attempts that must be made to reach an applicant to set them up to be tested. Nor is there any attempt made to reach an applicant by mail to set them up for testing. (Lester Deposition, pp. 59-60 and Short Deposition, pp. 23-26.)

- The tests are administered under the supervision of AK Steel and then sent to Resource Associates of Knoxville, Tennessee for grading.¹⁴
- Results of the test for each applicant are reported back to AK Steel as “qualified” or “not qualified”.¹⁵
- Those qualifying on the test are then scheduled, by phone, for an in-person interview with AK Steel Human Resource personnel at each Works.¹⁶
- The interview process¹⁷ looks for falsifications on the application and determines whether the applicant has a valid drivers license, prior drug usage, willingness to work rotating shifts, ability to use safety equipment, and subjective criteria such as motivation, conscientiousness, positive attitude and teamwork.¹⁸
- Those passing the interview are then subjected to a background check by an outside vendor to verify application information.¹⁹
- Those passing the background check are then offered employment contingent upon passing an in-house physical examination that includes a drug screen.²⁰
- Those passing the physical examination are then hired into the Laborer position.²¹

Data Considered for Analysis

Since the hiring procedure for Laborers at AK Steel has not changed since at least January 2000²² and the liability period goes back to June 30, 1999, I have evaluated the adverse impact of the hiring process for the entire three-year period of time for which hardcopy documents were provided.

From the Middletown Hardcopy and Middletown Images, I identified a total of 840 hires. The applicants of known race which were abstracted from the Middletown Hardcopy and Middletown Images, after eliminating duplicate applications from the same individual, were used as

¹⁴ Lester Deposition, pp. 69-71 and Short Deposition, pp. 27-30.

¹⁵ Lester Deposition, p. 71 and Short Deposition, p. 30.

¹⁶ No set procedures are in place regarding the number of attempts that must be made to reach an applicant to set them up for an interview. Nor is there any attempt made to reach an applicant by mail to set them up for an interview. (Lester Deposition, p. 79.)

¹⁷ A production supervisor or manager is sometimes present at the interview. (Lester Deposition, pp. 80-81 and Short Deposition, pp. 95-96.)

¹⁸ Lester Deposition, pp. 82-84 and Short Deposition, pp. 35-40.

¹⁹ Background checks are performed by Advantage of Pensacola for the Middletown Works (Short Deposition pp. 117-118) and by Backtrack of Mentor, Ohio for the Ashland Works (Lester Deposition p. 89).

²⁰ Lester Deposition, p. 104 and Short Deposition, p. 43-44.

²¹ Lester Deposition, p. 104 and Short Deposition, p. 43.

²² Lester Deposition, p. 19 and Short Deposition, p. 7.

the benchmark for the determination of adverse impact of the hiring process at the Middletown Works.²³

For the Ashland Works, I used the electronic data file²⁴ provided by the defendant and identified a total of 77 hires for the two-year period from October 24, 2000 through November 18, 2002.²⁵ The applicants of known race, after eliminating duplicate applications from the same individual, were used as the benchmark for the determination of adverse impact of the hiring process at the Ashland Works.²⁶

I also examined the Ashland Hardcopy and Ashland Images. However, these data could not be used in the analysis. Race was missing for more than 30% of the Ashland Hardcopy information. Also, no clear indication of which applicants were ultimately hired was provided in the Ashland Hardcopy information. The Ashland Hardcopy data included resumes that appeared to be provided instead of an actual application. No social security number was provided on most of these resumes, thereby not allowing for removal of duplicate individuals or matching to an application that may have also been submitted. The Ashland Images could not be used because 82% of the applicants were missing race information.²⁷

Analysis of the Total Selection Process

Table 1-A shows the results of my analysis of hires into Laborer positions at AK Steel as compared to the applicants, controlling for location.

²³ There were 7,086 unique applicants. I utilized the electronic file "Bert Data File 1 (W0330570).xls" to aid in determining the race of applicants whose tear sheet was missing or incomplete. Race information was ultimately unobtainable for 295, or 4.2%, of the applicants.

²⁴ Ashland App Flow (no ssn) (W0377464).xls.

²⁵ Application dates ranged from October 24, 2000 through September 17, 2000. Hire dates ranged from October 31, 2000 through November 18, 2002. I eliminated from the analysis one white applicant whose hire date was shown as March 30, 2004.

²⁶ There were 624 unique applicants. Race information was not provided for 40, or 6.4%, of this number.

²⁷ If the missing information noted in this paragraph is provided by the defendant, I will update my analysis for the hires at the Ashland Works for the period from November 18, 2002 to October 29, 2003 in my rebuttal report.

Fewer African-Americans than expected were hired overall and at each specific location. The adverse impact ratios were all less than the 80% allowed under the *Uniform Guidelines*. Overall, there were approximately 34, or 42.6%, fewer African-Americans hired than expected during the period analyzed. This difference is statistically significant with -4.26 standard deviations of difference and an adverse impact ratio of 55.1%. For the Middletown Works, there was a shortfall of approximately 30 African-Americans with a statistically significant difference of -3.85 standard deviations and an adverse impact ratio of 57.6%. For the Ashland Works, there was a shortfall of approximately 5 African-Americans with a statistically significant difference of -2.00 standard deviations and an adverse impact ratio of 28.5%.²⁸

Table 1-A. Analysis of Laborer Hires Compared to Applicants for the Period January 1, 2000 Through October 29, 2003

Location	Applicant Percent A-A	Total Hired	Actual A-A Hired	Expected A-A Hired	Actual Minus Expected	Number of Standard Deviations	Adverse Impact Ratio
Middletown	8.76	840	44	73.60	-29.60	-3.85	57.6%
Ashland	8.56	77	2	6.59	-4.59	-2.00	28.5%
Total	8.74	917	46	80.19	-34.19	-4.26	55.1%

Based on the above analysis, it is my opinion that the hiring process utilized by AK Steel has had an adverse impact against African-Americans applying for the Laborer positions at the Middletown and Ashland Works.

Incompleteness of Documentation

The Rule 30(b)(6) witnesses identified by AK Steel as having knowledge about the hiring process for Laborers at the Middletown Works and Ashland Works stated that the documentation regarding the various stages of the hiring process were not complete. Ms. Lester testified that she did

²⁸ These results are based on a two-year time frame for Ashland.

not have complete information regarding the applicant log,²⁹ the race of the applicants,³⁰ the results of the screening process,³¹ phone records for scheduling the test,³² the reason the applicant failed to take the test,³³ phone records for scheduling the interview,³⁴ records of who was no longer interested in accepting an offer,³⁵ and records of those applicants who failed the physical exam.³⁶ Ms. Short testified that she did not have complete information regarding the results of the screening process,³⁷ phone records for scheduling the test and the reason the applicant failed to take the test,³⁸ records of who failed the background check for falsification,³⁹ and records of who was no longer interested in accepting an offer.⁴⁰

Since the data for each stage of the hiring process is not complete, I cannot analyze separately the components of the selection procedure used for hiring into the Laborer positions at AK Steel.

Size of Potential Class

I have identified 645 African-Americans who have submitted applications for the Laborer positions at AK Steel during the period from January 1, 2000 through October 29, 2003.

Concluding Remarks

The opinions that I have expressed above are based on my education, training, teaching, research, professional consultations, publications, experience and expertise as detailed in my attached curriculum vitae, the “Information Relied Upon” materials, and my own analyses.

²⁹ Lester Deposition, pp. 10-12.

³⁰ Lester Deposition, pp. 16-18.

³¹ Lester Deposition, pp. 52-56.

³² Lester Deposition, pp. 59-60.

³³ Lester Deposition, p. 60.

³⁴ Lester Deposition, p. 79.

³⁵ Lester Deposition, p. 108.

³⁶ Lester Deposition, pp. 120-123.

³⁷ Short Deposition, pp. 86-88, 107-109, 111-113.

³⁸ Short Deposition, pp. 22-25, 91-92.

³⁹ Short Deposition, p. 130.

As my continuing review of the data I have been provided to date, or any additional data I may receive from the defendant, reveal additional areas of statistical analyses that need to be done, I will file supplemental reports.

Edwin Bradley, Jr.

Edwin L. Bradley, Ph.D.

04-18-05

Date

⁴⁰ Short Deposition, p. 131.

Appendix A

Curriculum Vitae

April 15, 2005

CURRICULUM VITAE

EDWIN LUTHER BRADLEY, JR.

CEO, Quantitative Research Associates
2015 Kentucky Avenue
Vestavia Hills, Alabama 35216
Phone: (205) 979-2991

RESIDENCE:

1836 Catala Road
Vestavia Hills, Alabama 35216
Phone: (205) 822-8428

PERSONAL DATA:

Born July 16, 1943 in Jacksonville, Florida.
Married, three grown children.

EDUCATION:

Bachelor of Science (with honors), August 1964
Mathematics Major
University of Florida

Master of Statistics, April 1967
Statistics Major
University of Florida

Doctor of Philosophy, December 1969
Statistics Major
University of Florida

PRIMARY ACADEMIC APPOINTMENTS:

1997-Present	Professor Emeritus Department of Biostatistics University of Alabama at Birmingham
1988-1997	Professor Department of Biostatistics University of Alabama at Birmingham
1976-1988	Associate Professor Department of Biostatistics (Formerly Biostatistics and Biomathematics) University of Alabama at Birmingham (Vice Chairman, 1978-1982)
1970-1976	Assistant Professor Department of Biostatistics University of Alabama at Birmingham

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SECONDARY ACADEMIC APPOINTMENTS AND OTHER PROFESSIONAL EXPERIENCE:

1973-1997	Professor, Associate Professor, Assistant Professor Department of Mathematics University of Alabama at Birmingham
1978-1980	Associate Diabetes Research and Training Center University of Alabama at Birmingham
1970-1977	Investigator Institute of Dental Research University of Alabama at Birmingham
1968-1969	Statistical Consultant Patuxent Wildlife Research Center Department of Interior Gainesville, Florida
1966-1969	Computer Programmer and Statistical Consultant University of Florida Gainesville, Florida
1965	Computer Programmer Lockheed-Georgia Company Marietta, Georgia

ADMINISTRATIVE APPOINTMENTS AND ACTIVITIES:

1993-1996	Member, Financial Aid Committee School of Public Health University of Alabama at Birmingham
1989-1997	Director, Graduate Program in Biostatistics Department of Biostatistics (Formerly Biostatistics and Biomathematics) University of Alabama at Birmingham
1989-1995	Member, Advisory Committee Postdoctoral Training Program in Caries Research University of Alabama at Birmingham
1985-1997	Chairman, Graduate Committee Department of Biostatistics (Formerly Biostatistics and Biomathematics) University of Alabama at Birmingham

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ADMINISTRATIVE APPOINTMENTS AND ACTIVITIES: (Continued)

1978-1982	Vice Chairman Department of Biostatistics University of Alabama at Birmingham
1979	Participant, UAB Funding Institute Office of Research and Grants Administration University of Alabama at Birmingham
1972-1973	Member, Accreditation Self Study Council Division of Biophysical Sciences University of Alabama at Birmingham

ASSOCIATIONS AND MEMBERSHIPS:

- Ø The Biometric Society, 1970 - Present
- Ø American Statistical Association , 1970 - Present
Member, National Council, 1982 - 1983
- Ø Alabama Chapter of American Statistical Association, 1970 - Present
Secretary-Treasurer, 1978-1979
Vice-President, 1980-1981
President, 1982-1983

HONORS AND AWARDS:

- Ø Phi Eta Sigma - Freshman Honorary, Elected 1962
- Ø Pi Mu Epsilon - Mathematics Honorary, Elected 1963
- Ø Phi Kappa Phi - Scholastic Honorary, Elected 1964
- Ø Sigma Xi - Scientific Honorary, Elected 1982
- Ø Emmett B. Carmichael Award for the Outstanding Paper in the Journal of the Alabama Academy of Science, 1987.
- Ø American Men and Women of Science

REVIEW REFEREE FOR THE FOLLOWING JOURNALS:

- Ø American Journal of Medical Sciences
- Ø Fertility and Sterility
- Ø Anesthesiology
- Ø Alabama Journal of Medical Science
- Ø Hypertension Journal
- Ø Technometrics
- Ø Journal of the American Statistical Association
- Ø American Statistician
- Ø Annals of Neurology
- Ø Clinical Trials

RESEARCH INTERESTS:

- Ø Statistical Computing
- Ø Statistical Modeling
- Ø Statistical Methodology and Applications

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TEACHING ACTIVITIES:

- Ø Statistical Analysis
- Ø Statistics in Biology
- Ø Design of Experiments
- Ø Probability
- Ø Inference
- Ø Least Squares
- Ø Nonparametric Statistics
- Ø Discrete Data Analysis
- Ø Stochastic Processes
- Ø Biometrical Consulting in Research
- Ø Nonlinear Data Analysis
- Ø Multivariate Analysis
- Ø Advanced Analysis

MASTERS' THESES AND PROJECTS DIRECTED:

Martha Perry Roton (1974): Statistical Inference in the Multinomial Distribution with Applications to Human Blood Groups. University of Alabama at Birmingham.

Wayne R. Satterwhite (1977): An Evaluation of a Cancer Rehabilitation Project. University of Alabama at Birmingham.

Sharon Truelove (1978): Models for the Prediction of the Survival of Patients Undergoing Primary Surgery for the Tetralogy of Fallot. University of Alabama at Birmingham.

Ray Allen McKinnis (1979): A Statistical Analysis of Burn Patient Care at the University of Alabama Hospital Burn Service. University of Alabama at Birmingham.

Gretchen A. Cloud (1982): An Exponential Family of Models. University of Alabama at Birmingham.

Carl M. Russell (1988): Two Approaches to Modeling the Mineral Density Profile of Dental Hard Tissues Exposed to Demineralizing Conditions. University of Alabama at Birmingham.

Tonya O. McMillan (1990): The Estimation of Cross - Correlation Coefficients in the Presence of Missing Data. University of Alabama at Birmingham.

Ellen S. Caldwell (1992): Comparing the Effects of Intervention Drugs on Cardiovascular Response to Intubation -- A Meta Analysis. University of Alabama at Birmingham.

Liesl M. Fox (1995): The Pseudo-Binomial Distribution: Applications in Survival Analysis. University of Alabama at Birmingham.

Traci E. Clemons (1996): The Overlapping Coefficient for Two Normal Probability Functions with Unequal Variances. University of Alabama at Birmingham.

Claudia C. Powell (1997): Least Squares Parameter Estimation for the Three-Parameter Weibull Distribution. University of Alabama at Birmingham.

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DOCTORAL DISSERTATIONS DIRECTED:

David Naftel (1978): A Generic Family of Survival Distributions. University of Alabama at Birmingham.

Henry F. Inman (1984): Behavior and Properties of the Overlapping Coefficient as a Measure of Agreement between Distributions. University of Alabama at Birmingham.

Larry G. Blackwood (1989): Contributions to the Theory and Application of the Rasch Model. University of Alabama at Birmingham.

Carl M. Russell (1992): A Simulation Study of Multivariate Randomization Testing Applied to Radiographic Cephalometry. University of Alabama at Birmingham.

Tonya M. Smoot (1993): The Use of Cubic Spline Interpolation in the Analysis of Incomplete Stationary Time Series. University of Alabama at Birmingham.

Traci E. Clemons (1997): A Nonparametric Approach to Estimating the Overlapping Coefficient Using the Kernel Estimation Technique. University of Alabama at Birmingham.

Liesl M. Fox (1997): An Exploration of the Pseudo-Binomial Distribution With Applications to Survival Curve Confidence Intervals. University of Alabama at Birmingham.

PRESENTATIONS AND INVITED SEMINARS:

The Queue GI/M/1 with Balking at Queues of a Fixed Length. Alabama Chapter, American Statistical Association. Tuscaloosa, Alabama, February 21, 1970.

The Effect of pH and Hexamine Concentration upon the Extinction of E. Coli. Alabama Chapter, American Statistical Association, Birmingham, Alabama, February 27, 1971.

A Sufficient Condition for the Equivalence of Maximum Likelihood and Weighted Least Squares Estimates. Alabama Chapter, American Statistical Association, Birmingham, Alabama, June 17, 1972.

The Overlapping Coefficient as a Measure of Agreement between Distributions, with S. Piantadosi. Alabama Chapter, American Statistical Association, Birmingham, Alabama, February 27, 1982.

Some Discrete Distributions Useful in Dentistry. Caries Epidemiology and Clinical Trials Seminar Series, School of Dentistry, Winter, 1983.

Overlapping Coefficient: A Measure of Agreement Between Distributions, with Steven Piantadosi and Henry F. Inman. Biometric Society (ENAR), Spring Meeting, Nashville, March 20-23, 1983.

The Overlapping Coefficient as a Measure of Association in 2 x k Contingency Tables. With H. Inman. Alabama Chapter, American Statistical Association, Birmingham, Alabama, February 4, 1984.

Statistical Approaches for the Analysis of Anesthetic Mortality. Anesthesiology Residents Research Conference, University of Alabama at Birmingham, Fall 1984.

Power Analysis in Statistics. Anesthesiology Residents Research Conference, University of Alabama at Birmingham, Winter 1985.

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PRESENTATIONS AND INVITED SEMINARS: (Continued)

Probit Analysis and Isoboles. Biostatistics Seminar Series, University of Alabama at Birmingham, Winter, 1986.

A Generalized and Unified Model for Predicting Long Term ²²²Rn Concentrations from Short Term Screening Tests, with J.M. Hardin. Third Environmetrics Conference, Madison, Wisconsin, October, 1991.

The Flat Maximum Effect and Generic Linear Scoring Models: A Test, with George A. Overstreet and Robert S. Kemp. Conference on Credit Scoring and Credit Control II, University of Edinburgh, Scotland, September, 1991.

TECHNICAL REPORTS:

Saw JG, **Bradley EL** (1969): The proportion of baulking customers in the queue GI/M/1 with baulking at queues of length N. Project Themis. Technical Report No. 15. University of Florida.

Saw JG, **Bradley EL** (1969): A reordering policy with instantaneous emergency delivery. Project Themis. Technical Report No. 16, University of Florida.

Lyle ES, Jr Patterson RM, Hicks DR, **Bradley EL** (1975): Polymorphic site index curves for natural sweetgum in Alabama. Agriculture Experiment Station, Auburn University. Circular 220, October.

PUBLICATIONS:

Bradley EL (1969): Queues with baulking and their application to an inventory problem. Doctoral dissertation, University of Florida.

Hunt DE, **Bradley EL**, Bachman JW (1970): Microbiological assay for estimating salivary concentrations of the cariostatic antibiotic actinobolin. *Applied Microbiology*, 20(4):583-586.

Legler DW, Mayhall CW, **Bradley EL** (1972): Behavioral characteristics of disadvantaged adult patients. *Journal of Public Health Dentistry*, 32(1):15-21.

Formicola AJ, Grupe HE, **Bradley EL**, Weatherford TW, Hunt DE (1972): A clinical evaluation of a proteolytic enzyme mouthwash on plaque and gingivitis in children. *The New York State Dental Journal*, 38(6):334-340.

Bradley EL, Saw JG (1972): Choosing the optimum lot size for a reordering policy with instantaneous emergency deliveries. *Technometrics*, 14 (4):931-934.

Stickley Jr AR, Mitchell RT, Health RG, Ingram CR, **Bradley EL** (1972): A method for appraising the bird repellency of 4-aminopyridine. *The Journal of Wildlife Management*, 36(4):1313-1316.

Bradley EL (1973): The equivalence of maximum likelihood and weighted least squares estimates in the exponential family. *Journal of the American Statistical Association*, 68(341):199-200.

Zuniga MA, Lopez H, Sandham HJ, **Bradley EL**, Koulourides T (1973): Calcium and phosphorous contents of dental plaques and microhardness changes of sample enamel in the human mouth. *Alabama Journal of Medical Sciences*, 10 (1):3-10.

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PUBLICATIONS (Continued):

Thomas JP, **Bradley EL** (1973). Tetracycline effect on calcification of the molars of rat offspring. *Alabama Journal of Medical Sciences*, 10(1):89-97.

Ikeda T, Sandham HJ, **Bradley EL** (1973): Changes in streptococcus mutans and lactobacilli in plaque in relation to the initiation of dental caries in negro children. *Archs Oral Biology*, 18:555-556.

Robinson G E, **Bradley EL** (1974): TEAM vs. DAU: A study of clinical productivity. *Medical Care*, 12(8):693-708.

Sapsford RN, Blackstone EH, Kirklin JW, Karp RB, Kouchoukos NT, Pacifico AD, Roe CR, **Bradley EL** (1974): Coronary perfusion versus cold ischemic arrest during aortic valve surgery: A randomized study. *Circulation*, 49:1190-1199.

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Karen Yapp, et al. vs. Union Pacific Railroad Company: 4:02CV00615SNL (2003-2004): US District Court for the Eastern District of Missouri, Eastern Division. Robert F. Childs, plaintiff attorney. Racial discrimination in promotions. Deposition and trial testimony.

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